medal and £25. Series viii. (to be sent in not later than May 1, 1889): No. 27, 'On the chemistry of the Australian gums and resins,' the society's medal and £25; No. 28, 'On the aborigines of Australia,' the society's medal and £25; No. 29, 'On the iron-ore deposits of New South Wales,' the society's medal and £25; No. 30, 'List of the marine fauna of Port Jackson, with descriptive notes as to habits, distribution, etc.,' the society's medal and £35. The competition is in no way confined to members of the society, nor to residents in Australia, but is open to all without restriction. No award will be made for a mere compilation, however meritorious in its way: the communication, to be successful, must be either wholly or in part the result of original observation or research on the part of the contributor.

— The annual report of the director of the Harvard observatory, which was presented to the visiting committtee on Dec. 7, has just been printed as a part of the report of the president of the university. Professor Pickering is to be congratulated upon the highly satisfactory financial basis on which the observatory is at length placed, through the munificence of the late Robert Treat Paine. About half of the Paine bequest, or $164,198, is now available; and the endowment of the observatory, which was $164,000 in 1875, and $227,000 in 1885, has now risen to $398,046. A share of the increased funds must be applied, for the present, to needed repairs, and to the publication of observations already made. The 15-inch equatorial is to have a new mounting, and Professor Pickering hopes that at no distant day means may be found for replacing the observatory building by one better adapted to the requirements of modern astronomy. The report details the work of the various instruments, particular attention being given to the subject of photometry, as in past years. The most important new work of the observatory is in the field of stellar photography. For this investigation Mrs. Draper has lent the 11-inch photographic lens employed by her husband, the late Dr. Henry Draper, at his observatory on the Hudson, and has provided means for its new mounting, as well as for the prosecution of the researches to which it is to be devoted. We regret to note the resignation of Professor Rogers, the first assistant for the past fifteen years, and the observatory suffers a second loss in the resignation from its staff off Mr. S. C. Chandler, jun.

— During the past week the U. S. fish commission made the following distribution of California trout in the localities given: 300 yearling trout were placed in Swinks Lake, near Scottsboro, Ala.; 175 yearling in Sauters Creek, Ala.; 175 two-year-old in Paint Creek, Ala.; 175 yearling in Bear Creek, near Benton, Ala.; 75 yearling and 100 two-year-old in Flint River, near Brownsboro, Ala.; 175 one-year-old in Crow Creek, Ala.; 175 two-year-old in Lookout Creek, near Rising Fawn, Ga.; 178 two-year-old in the South Fork of the Chickamauga River, near Chattanooga, Tenn. The next distribution of trout will be made during the coming week, and will cover the states of Ohio, Indiana, and Michigan.

— It has been settled that the gift of President White's valuable historical library to Cornell university is to be followed by the erection of a large library building by the college authorities.

LETTERS TO THE EDITOR.

***Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

Sources of nitrogen assimilated by growing plants.

IN my address before section C at Buffalo last August, I gave a *résumé* of the investigations made up to that time in respect of the sources of nitrogen consumed by plants. The general conclusions of this paper were given in the abstract of the address, which appeared in *Science*. Since that time two important investigations have been published, and I feel that I ought to add an abstract of these as a supplement to the one you made.

Atwater (*Amer. chem. journ.*, viii. Nos. 5 and 6) has shown, in two papers recently published, that in many cases there is a loss of nitrogen in germinating plants: in other words, nitrogen that may be present in a nitrified form, or in a form easily nitrified, may escape assimilation by being set free by the denitrifying ferment described by Gayon and Dupetit and Springer. The importance of this fact seems to have been overlooked by most investigators, and the intimate relation it has to all studies of nitrogen-assimilation will not be denied by any one. Generally it has been assumed, that, if plants show an amount of assimilated nitrogen equal to that in the seed and food supplied, it is a proof that no free nitrogen has been consumed, either directly or indirectly. But if it should be established that much assimilable nitrogen in the seed or food may be lost, then the above assumption cannot be true. As a contribution to the study of this interesting problem, Atwater's papers are worthy of careful consideration.

Hellriegel (*Zeit. d. Ver. f. d. Rübenzucker-Industrie*, November, 1886) has lately published a paper in which he shows that an active nitrifying ferment may prepare unassimilable nitrogen for plant-food. While the Gramineae appear to possess little capability of being nourished by the nitrogen that can be derived from the atmosphere, the Papillionaceae possess this power to a remarkable extent. To a sterilized earth free of nitrogen was added a few cubic centimetres of an aqueous extract of earth taken from a field where peas were in active growth. Peas were sprouted in pots of nitrogen-free and sterilized earth, and continued to grow until the nitrogen-supply of the seed was exhausted. They all then passed into a state of starvation. To some

of these pots the earth-extract mentioned above was added. In a few days the plants took on a new growth, totally out of proportion to what could have been caused by the minute quantity of combined nitrogen contained in the extract. The plants in the pots not receiving this remained in a dying condition. The micro-organisms in the case just mentioned inhabit a small bulb which appears on the roots of the plant, and in this laboratory the transformation of the nitrogen appears to take place.

These later investigations lend emphasis to the statement I made in my Buffalo address: "These views of chemists so distinguished, based as they are on a series of experiments, extended and laborious, even if not above criticism, must command our most serious attention. They expressly admit the possibility of the use of the free nitrogen of the atmosphere, but are careful not to literally affirm it."

H. W. WILEY.

Washington, Jan. 28.

Halos seen at Denver.

On the afternoon of Friday, Jan. 7, and in the evening, there was a brilliant display of halos, etc., at Denver. I have been told that it began at about 1 P.M., but I did not see it until 2.30 P.M. At that time the sky was of a milky hue, from the presence of the ice-clouds. The parhelic circle, passing through the sun, parallel to the horizon, could be traced entirely around the sky, except in the immediate vicinity of the sun: parts of it were at times temporarily obscured by small, swiftly passing clouds. The two principal parhelia, 22° distant from the sun, were very bright, and secondary parhelia were seen at a distance of 120°. The halo of 22° radius, encircling the sun, was incomplete. In the zenith was a faint circle of red light about 20° in diameter. The quadrant nearest the sun was expanded into a magnificent lune 2° wide at the broadest place: it displayed the prismatic colors from red to violet, the red border being toward the sun. As the sun descended toward the west, the lune grew narrower and longer, being only 1° broad at 3.30 P.M. During the next ten minutes, clouds rising from the western horizon obscured the sun, and with it the parhelic circle. The lune was visible for a short time after the sun had disappeared, but at 3.40 P.M. it too had vanished. By looking toward the west during the display, the ice-crystals near the earth's surface were plainly visible, and had the form of slender needles.

In the evening the sky seemed clear, and the moon, lacking two days of being full, shone brightly. The paraselenic circle was complete, and beautifully contrasted with the dark sky. It was 1½° broad opposite the moon, and grew narrower as it approached that luminary. It could be traced almost up to the moon's disk. At 8 P.M. the halo of 22° radius about the moon was very distinct: at the highest and lowest points there were rudimentary tangent arcs, and a consequent increase of brilliancy at those points. The paraselenae were not at the intersection of the halo with the paraselenic circle, but on the latter about 3° or 4° outside of the halo. The inner edge of the halo was a red circle, but the outer edge was an ill-defined ellipse, the major axis of which stretched between the two paraselenae, while its minor axis coincided with the vertical diameter of the red circle. The space between the inner and outer edges was filled with milky light. At 8.30 P.M. the paraselenae had disappeared. Secondary paraselenae were seen at distances of 120° from the moon. At 9 P.M. a bright arc having a uniform breadth of 3°, and exhibiting prismatic colors, was seen in the southeast, being a portion of a circle of about 40° radius, in the centre of which lay the moon. It passed through the triangle of conspicuous stars (δ, ϵ, η) in Canis Major. At 9.30 P.M. all the circles except this one had vanished, and at 10.30 it too had gone. I have been told that after midnight the entire system of circles re-appeared. There was no lune in the zenith before midnight, or after, as far as I have been able to learn. It was possible to see the ice-crystals floating down by looking toward the moon. I regret that I had no instruments for making accurate measurements of the angular distances which I estimated.

H. A. HOWE.

Denver university, Jan. 28.

Consumption among Indians.

In *Science* for Jan. 21 (p. 76) reference is made to a supposition that "it is change of diet which is the most potent remote cause of consumption among the Indians." Another cause, in my opinion, is change of dress. Before he came under the influence of civilization, the Indian was not clothed in garments that would interfere with the free action of the pores of the skin. If a live rabbit be dipped in a solution of glue, so as to cover its body with a coating impervious to air, it is surprising how quickly the frequency of the respiratory movements increases, showing that the work of the lungs is increased by depriving the skin of free access to the air.

The process of civilization has a somewhat similar effect upon the Indian, though to a less degree. One of the first lessons in the effort to civilize him teaches him to envelop himself in clothing of a kind that tends to impede and impair the normal action of the skin, the pores of which are organs of excretion, — a mechanism by which morbid and waste material may be thrown out of the system. Deprived of the assistance afforded under previous conditions by the skin, the work of the lungs is greatly increased, rendering them peculiarly susceptible to bronchitis and pneumonia, — ailments which are commonly the forerunners of consumption. If we accept the theory of Koch, they make the lungs a suitable habitation for the bacillus tuberculosis.

If we study the pre-tubercular history of man, we find his clothing in those times far different from what it is to-day, when the percentage of death from consumption reaches so high a figure.

The fact that the mortality from consumption among the Indians immediately after they come under the influence of our civilization is so much greater than among the whites proves the truth of what I have advanced. We have had our liability to consumption from overworked lungs tempered by hundreds of generations of ancestors habituated to the use of clothing, so that our risk is much less.

The facts underlying these views are, 1°, the lungs are not the only organs of respiration; 2°, they are important excretory organs, and, like the kidneys or liver, they may be overworked; 3°, the skin, in its natural condition, as an organ of respiration and excretion, is a most important adjunct of the lungs.

HAL. C. WYMAN.

Detroit, Mich., Jan. 22.